

Local Limits Calculation

Table 1 - Unit Operations (X if present)

Activated Sludge Filter Present?	Trickling Filter Present?	Nitrification Present?	Anaerobic Digestion Present?	Sludge Incineration Present?
X			X	

Placing an "X" in the cell under a treatment unit will activate the inhibition calculations for that unit or the sludge incineration calculations.

TABLE 2a - Stream Flow Partial Mix Factors

Q7-10 Stream Flow (MGD) (Q7-10)	Harmonic Mean Stream Flow (MGD) (Qhm)	Drinking Water Intake Stream Flow (MGD) (Qdw)	Chronic Partial Mix Factor (PMFc)	Acute Partial Mix Factor (PMFa)	Cancer Risk Level Partial Mix Factor (PMFcrl)
1874	5099	0.073	0.508	0.073	0.706

(Q7-10)
(Qhm)
(Qdw)
(PMFa)
(PMFc)
(PMFcrl)

7-day, 10-year low flow for receiving stream in MGD (user entered).
Harmonic mean flow for receiving stream in MGD (user entered).
Flow for receiving stream at nearest downstream drinking water intake (user entered).
Partial mix factor for acute water quality standards (user entered).
Partial mix factor for chronic water quality standards (user entered).
Partial mix factor for cancer risk level water quality standards (user entered).

TABLE 2b - POTW and Receiving Stream Data

POTW Flow (MGD) (Qpotw)	IU Flow (MGD) (Qind)	Sludge Flow to Digester (MGD) (Qdig)	Sludge Flow to Disposal (MTD) (Qsldg)	Stream Flow for Chronic WQS (MGD) (Qstr1)	Stream Flow for Acute WQS (MGD) (Qstr2)	Stream Flow for Threshold Human Health WQS (MGD) (Qstr3)	Stream Flow for Carcinogen Human Health WQS (MGD) (Qstr4)	Receiving Stream Hardness (mg/l) (H)	Hauled Waste Flow to Influent (MGD) (Qhwi)	Hauled Waste Flow to Sludge Processing (MGD) (Qhws)	Sludge Flow to Incineration (MTD) (Qinc)
5.874	0.367	0.037	0.91	951.99	136.80	1874.00	3599.89	122	0	0	0

(Qpotw)
(Qind)
(Qdig)
(Qsldg)
(Qstr1)
Qstr1 =
(Qstr2)
Qstr2 =
(Qstr3)
(Qstr4)
Qstr4 =
or Qstr4 =
(H)
(Qhwi)
(Qhws)
(Qinc)

POTW's average flow in MGD (user entered).
Average discharge flow of Industrial Users to be regulated through the local limits in MGD (user entered).
Average sludge flow to digester in MGD (user entered).
Average sludge flow to disposal in dry metric tons per day (user entered).
Receiving stream (upstream) flow used with chronic water quality standards in MGD (calculated).
Q7-10 * PMFc (data from Table 2(a), cells B17 and E17); if cell E17 is blank, PMFc assumed to be 1.
Receiving stream (upstream) flow used with acute water quality standards in MGD (calculated).
Q7-10 * PMFa (data from Table 2(a), cells B17 and F17); if cell F17 is blank, PMFa assumed to be 1.
Receiving stream (upstream) flow used with threshold human health water quality standards in MGD (from Table 2(a), cell B17).
Receiving stream (upstream) flow used with carcinogen human health water quality standards in MGD (calculated).
Qhm * PMFcrl (data from Table 2(a), cells C17 and G17); if cell G17 is blank, PMFcrl assumed to be 1; if cell C17 is blank, formula below is used:
PMFcrl * 7.43 * (Q7-10)^{0.874} (data from Table 2(a), cell G17 and B17)
Receiving stream hardness in mg/l (user entered).
Hauled waste flow discharged at the influent of the treatment plant in MGD (user entered).
Hauled waste flow discharged directly to the sludge processing units in MGD (user entered).
Average sludge flow to incineration in dry metric tons per day (user entered).

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TABLE 4 - Allowable Headworks Loadings Based on Chronic Water Quality Standards

[illegible]

(Qpotw)	POTW's average flow in MGD (from Table 2(b), cell B34).
(Qstr1)	Receiving stream (upstream) flow used with chronic water quality standards in MGD (from Table 2(b), cell F34).
(Cstr)	Receiving stream background concentration in mg/l (user entered)
(Ccrit)	State chronic water quality standard for a particular pollutant in mg/l (from PADEP Chapter 98.3c Table 5 or user entered)
(Rpotw)	Removal efficiency across POTW as percent (from Table 3, column E).
(AHLcwq)	Allowable headworks pollutant loading to the POTW in pounds per day based on chronic water quality standards (lbs/day - calculated).
AHLcwq =	$8.34 * (Ccrit * (Qstr1 + Qpotw) - (Cstr * Qstr1)) / (1 - Rpotw/100)$
8.34	Unit conversion factor

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TABLE 5 - Allowable Headworks Loadings Based on Acute Water Quality Standards

[illegible]

Qpotw)	POTW's average flow in MGD (from Table 2(b), cell B34).
(Qstr2)	Receiving stream (upstream) flow used with acute water quality standards in MGD (from Table 2(b), cell G34).
(Cstr)	Receiving stream background concentration in mg/l (from Table 4, column D).
(Ccrit)	State acute water quality standard for a particular pollutant in mg/l (from PADEP Chapter 98.3c Table 5 or user entered)
(Rpotw)	Remove efficiency across POTW as percent (from Table 3, column E).
(AHLawq)	Allowable headworks pollutant loading to the POTW in pounds per day based on acute water quality standards (lbs/day - calculated).
AHLawq =	$8.34 * (Ccrit * (Qstr2 + Qpotw) - (Cstr * Qstr2)) / (1 - Rpotw/100)$
8.34	Unit conversion factor

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TABLE 9 - Allowable Headworks Loadings Based on Trickling Filter Inhibition Level

[illegible]

(Qpotw)	POTW's average flow in MGD (from Table 2(b), cell B34).
(Ccrit)	Trickling filter threshold inhibition level, mg/l (EPA default or user entered).
Select Removal Efficiency	Select removal efficiency for column E from drop down list.
(Rprim)	Removal efficiency prior to trickling filter treatment unit as percent (Prior to Trick Fil ('Inhibition Removals' worksheet row 49), EPA default, or user entered).
(AHLtfi)	Allowable headworks pollutant loading to the POTW in pounds per day based on inhibition of trickling filter units (lbs/day - calculated).
AHLtfi =	$8.34 * (Ccrit * Qpotw) / (1 - Rprim/100)$
8.34	Unit conversion factor

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TABLE 11 - Allowable Headworks Loadings Based on Anaerobic Digester Inhibition Level (Conservative Pollutants)

[illegible]

(Qpotw)	POTW's average flow in MGD (from Table 2(b), cell B34).
(Qdig)	Average sludge flow to digester in MGD (from Table 2(b), cell D34).
(Ccrit)	Anaerobic digester threshold inhibition level in mg/l (EPA default or user entered).
(Rpotw)	Removal efficiency across POTW as percent (from Table 3, column E).
(AHLadi)	Allowable headworks pollutant loading to the POTW in pounds per day based on inhibition of anaerobic digester units (lbs/day - calculated).
AHLadi =	$(8.34 * Ccrit * Qdig) / (Rpotw/100)$
8.34	Unit conversion factor

Yes	No

Has the POTW Experienced Inhibition or Construction Within the Data Time Frame?

[illegible]

AHL (ACT. SLUDGE) =	Allowable Headworks Loading based on inhibition of the activated sludge treatment units from Table 8, column F.
AHL (TRICK. FILTER) =	Allowable Headworks Loading based on inhibition of the trickling filter treatment units from Table 9, column F.
AHL (NITRIF.) =	Allowable Headworks Loading based on inhibition of the nitrification treatment units from Table 10, column F.
AHL (DIG. - CONSERV.) =	Allowable Headworks Loading based on inhibition of the anaerobic digester treatment units for conservative pollutants from Table 11 column F.
AHL (DIG. - NON-CONS.) =	Allowable Headworks Loading based on inhibition of the anaerobic digester treatment units for non-conservative pollutants from Table 12, column G.
Most Stringent (INHIBITION)	Lowest value for each pollutant from columns B through F.
(Cmaxin)	Maximum Influent Concentration (from 'Monitoring Data' worksheet, row 44).
(Cmaxino)	Maximum Influent Concentration observed at treatment plant but not listed (or eliminated from) 'Monitoring Data' worksheet (user entered).
(Lmaxin)	Maximum Influent Loading (calculated).
Lmaxin =	$8.34 * C_{maxin} * Q_{potw}$; where Cmaxin is the greater of Cmaxin and Cmaxino.
8.34	Unit conversion factor
(Qpotw)	POTW's average flow in MGD (from Table 2(b), cell B34).
AHL (INHIBITION) =	Highest value for each pollutant from column G or J.
	Red Bold in column K indicates that the allowable headworks loading is based on the maximum influent loading.

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TABLE 14 - Allowable Headworks Loadings Based on Land Application Sludge Disposal

[illegible]

(Qpotw)	POTW's average flow in MGD (from Table 2(b), cell B34).
(Qsldg)	Average sludge flow to disposal in dry metric tons per day (from Table 2(b), cell E34).
(Cslcrit)	Applicable sludge standard in mg/kg dry sludge (exceptional quality standard for land application or user entered).
(Rpotw)	Removal efficiency across POTW as a percent (from Table 3, column E).
(AhLlas)	Allowable headworks pollutant loading to the POTW in pounds per day based on land application sludge disposal (lbs/day - calculated).
AhLlas =	$(0.0022 * Cslcrit * Qsldg) / (Rpotw/100)$
0.0022	Unit conversion factor

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TABLE 17 - Comparison of Allowable Headworks Loadings

[illegible]

AHL (WATER QUALITY) =

Allowable Headworks Loading based on protection of water quality from Table 7, column F.

AHL (INHIBITION) =

Allowable Headworks Loading based on prevention of inhibition from Table 13, column K.

AHL (SLUDGE) =

Allowable Headworks Loading based on protection of sludge quality from Table 16, column G.

Design Loading of POTW treatment plant (user entered).

MAHL

Maximum allowable headworks loading is the lowest value for each pollutant from columns B through E.

TABLE 18 - Calculation of Local Limit

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[illegible]

(MAHL)	Maximum allowable headworks loading (from Table 17, column F).
(SF)	Safety factor as a percent (user entered).
(GA)	Growth allowance as a percent (user entered).
(Cback)	Average nonindustrial background concentration for a particular pollutant in mg/l (from 'Monitoring Data' worksheet row 43 or user entered).
(Qback)	Average nonindustrial background flow in MGD (calculated).
Qback =	Qpotw - Qind - Qhwi (values from Table 2(b), cells B34, C34, and K34)
(Lback)	Average nonindustrial background loading to the POTW for a particular pollutant in pounds per day (calculated).
Lback =	8.34 * Cback * Qback
8.34	Unit conversion factor
(Chwi)	Average concentration for a particular pollutant in mg/l for hauled waste discharged at the POTW influent (from 'Monitoring Data' worksheet, row 43).
(Qhwi)	Average flow in MGD for hauled waste discharged at the POTW influent (from Table 2(b), cell K34).
(Lhwi)	Average loading to the POTW for a particular pollutant in pounds per day for hauled waste discharged at the POTW influent (calculated).
Lhwi =	8.34 * Chwi * Qhwi
(MAIL)	Maximum Allowable Industrial Load (calculated).
MAIL =	MAHL - (MAHL * SF/100) - (MAHL * GA/100) - Lback - Lhwi
(Cind)	Industrial allowable local limit for a given pollutant in mg/l (calculated).
Cind =	MAIL/(8.34 * Qind)
(Qind)	Average discharge flow of Industrial Users to be regulated through the local limits in MGD (from Table 2(b), cell C34).
Basis of Limitation	An identification of the lowest allowable headworks loading from Table 17 columns B through D.
	Red Bold in column C or D indicates a safety factor or growth allowance of less than 10%.

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TABLE 21 - Calculation of Influent, Effluent, and Sludge Goals

[illegible]

MAHL)	Maximum allowable headworks loading (from Table 18 column B).
(Qpotw)	POTW's average flow in MGD (from Table 2(b), cell B34).
(MAHC)	Maximum Allowable Headworks Concentration - influent concentration necessary to meet effluent, sludge, and inhibition goals (calculated).
MAHC =	MAHL/(Qpotw * 8.34)
8.34	Unit conversion factor
(AHLwq)	Allowable Headworks Loading based on protection of water quality from Table 7, column F.
(Rpotw)	Removal efficiency across POTW as percent (from Table 3, column E).
(Effluent Goal)	Discharge concentration necessary to meet NPDES limit or water quality standards (calculated)
Effluent Goal =	(AHLwq) * (1-Rpotw/100)/(8.34 * Qpotw)
(AHLs)	Allowable Headworks Loading based on protection of sludge quality from Table 16, column G.
(Qsldg)	Average sludge flow to disposal in dry metric tons per day (from Table 2(b), cell E34).
(Sludge Goal)	Sludge standard used in headworks calculations for sludge protection (calculated)
Sludge Goal =	AHLs * (Rpotw/100) / (0.0022 * Qsldg)
0.0022	Unit conversion factor

